

Parameters and Variables list

Table 1. Parameters list 1.

Parameters:	Values:
k_1 : Rate constant of forward auto-phosphorylation	0.23 1/ μ M hr
k_{-1} : Rate constant of backward auto-phosphorylation	0.0000051 1/ μ M hr
k_2 : Rate constant of forward phosphyl-group transfer	0.00227 1/ μ M hr
k_{-2} : Rate constant of backward phosphyl-group transfer	0.00087 1/ μ M hr
α : Adjustable proportionality coefficient of ATP	0.001223
β : Adjustable proportionality coefficient of ADP	0.001223
K_b : Dissociation constant (<i>KdpE</i> -DNA)	0.0532 1/ μ M
K_h : Dissociation constant (<i>KdpF</i> - <i>KdpE</i> dephosphorylationsystem)	0.0532 μ M (adjustable)
k_h^0 : Reference k_h value	0.00023 1/ μ M hr (adjustable)
$C_{K^+}^0$: Reference concentration of potassium ions	0.02mM
k_{tr} : transcription rate constant	10600 hr ⁻¹
k_z : mRNA degradation rate of <i>kdpFABC</i> and <i>kdpDE</i> coding region	21.74 hr ⁻¹
k_d : degradation rate of <i>KdpDE</i>	0.2 hr ⁻¹
$k_{d,F}$: degradation of <i>KdpF</i>	4.8 hr ⁻¹
k_{tlD} : translation rate constant of <i>KdpD</i>	160 hr ⁻¹
k_{tlE} : translation rate constant of <i>KdpE</i>	8100 hr ⁻¹
k_{tlF} : translation rate constant of <i>KdpF</i>	5.4 hr ⁻¹
μ : growth rate of the cell (in K minimal medium, 2 nd order)	0.275466667 hr ⁻¹ (exp. obtained)
Ψ : basal activity of the promoter	0.0017
$k_{deg,GFP,mRNA}$: GFP mRNA degradation rate (1 st order)	0.0048s ⁻¹ =17.28 /hr
γ_i : Immature GFP degradation rate	0.7 hr ⁻¹
γ_m : Mature GFP degradation rate	0.021 hr ⁻¹
ρ : Immature GFP synthesis rate (trans rate, 1 st order)	1440 protein/hr/mRNA (0.4protein/s/mRNA)
w : GFP maturation rate (1 st order)	6.48 hr ⁻¹

Table 2. Parameters list 2.

Parameters	Values
ADP concentration	0.305 mM
ATP concentration	3.05 mM
Initial concentration of mRNA (GFP)	0/cell
Concentration of <i>KdpF</i>	10 μ M
Concentration of <i>KdpE</i>	2.6 μ M
Concentration of <i>KdpD</i>	2.6 μ M
Concentration of inserted plasmid	0.0183 μ M
Initial concentration of immature and mature GFP	0 /cell

Table 3. Variables list.

Variables	Denotation	Unit
[kdpD]	Concentration of <i>KdpD</i>	μ M
[kdpD ^P]	Concentration of phosphorylated <i>KdpD</i>	μ M
[kdpE ^P]	Concentration of phosphorylated <i>KdpE</i>	μ M
[ADP]	Concentration of ADP molecules	mM
[ATP]	Concentration of ATP molecules	mM
[kdpF]	Concentration of <i>KdpF</i>	μ M
k ₃	Rate constant of dephosphorylation of <i>KdpE</i>	-
k _h	Adjustable parameter	-
c _{K⁺}	Concentration of potassium ions	mM
[kdpE - DNA]	Concentration of <i>KdpE</i> bound promoter P _{kdpF}	μ M
[DNA _f]	Concentration of Unbound promoter P _{kdpF}	μ M
[DNA ₀]	Total concentration of promoter P _{kdpF}	μ M
[mRNA _{GFP}]	Concentration of mRNA molecules for green fluorescence protein	μ M
[GFP _i]	Concentration of immature green fluorescent protein	μ M
[GFP _M]	Concentration of mature green fluorescent protein	μ M